NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (NIEHS)

I. Statement of Institute Mission:

The National Institute of Environmental Health Sciences' (NIEHS) Strategic Plan represents the Institute's planned research efforts for the elimination of disparities in health experienced by minorities and the socioeconomically-disadvantaged of the American population. The mission of the NIEHS is to reduce the burden of environmentally associated diseases by defining:

- how environmental exposures affect our health;
- how individuals differ in their susceptibility to these exposures; and
- how these susceptibilities change with age."

II Area of Focus #1: Overall Health Disparities

Introduction/Background: The poor have worse health than other population groups, resulting in shorter life expectancy, higher cancer rates, more birth defects, greater infant mortality, and higher incidence of asthma, diabetes, and cardiovascular disease. The ways in which poverty creates these health disparities are still poorly understood. There is increasing evidence that these groups are burdened with a disproportionate share of residential and occupational exposure to hazardous substances such as lead, PCBs, wood dusts, and air pollutants. Thus, both social and physical environmental exposures represent an important area of investigation for understanding and ameliorating the health disparities suffered by the disadvantaged of this nation.

A number of NIEHS programs are already in place with the goal of providing the research needed to understand and prevent environmentally-related disease in minority and disadvantaged populations. The focus of many of these new programs is to allow researchers to design and conduct needed studies in partnership with members of the affected communities. The NIEHS Community-Based Prevention/Intervention Research (CBPIR) Program is a prevention/intervention program that promotes community involvement in addressing its health concerns. The following are NIEHS CBPIR programs/studies for urban and socioeconomically-disadvantaged populations:

- Evaluation of Nurse Management and Peer Counseling in the reduction of severe asthmatic episodes. Assessment of Asthma-control and prevention methods, such as case management and environmental control, in pregnant women.
- Analysis of cockroach and dust allergen exposure on asthma.
- Two initiatives are focusing on minority and disadvantaged children who will be monitored for the prevalence of high blood lead levels. Behavioral observation and exposure intervention strategies will be evaluated for effectiveness.
- Investigation of pesticide contamination in agricultural communities with a concentration on pesticide exposure among the communities' children.

- A study focused on the disadvantaged and medically-underserved populace will examine farmworkers and their service providers regarding development of intervention strategies to agrichemical exposures.
- Assessment of an intervention strategy for the reduction of agricultural chemical exposure.

In addition, NIEHS was the lead institute on the recently issued trans-NIH RFA on Health Disparities Research. Other NIEHS programs focusing on health effects of disparities in environmental exposures:

- Migrant Farmworkers: The NIEHS has established Environmental Health Centers in academic institutions where the main scientific focus is on environmental health issues. The Center at the University of California—Davis discovered through its NIEHS Community Outreach and Education Program that required farmworkers' assays of acetylcholinesterase blood levels, an enzyme that functions as a biomarker of exposure to major pesticides, were inaccurate. The Center is presently working with the State of California on increasing the accuracy of exposure test methods.
- Minority Farmers' Pesticide Exposure: NIEHS Environmental Health Centers at the following three universities—University of Iowa, University of California at Davis and Oregon State University—focus on defining occupational health concerns of agricultural workers and developing prevention/intervention strategies against hazardous exposure.
- Neurological Function in Farmworkers: A cross-sectional study is being funded by NIEHS on the effects of consistent, low-level exposure on farmworkers and its neurological effects. This study is a joint effort with a central Floridian grassroots organization.

Goal 1: Improve understanding about causes of disease in minority and disadvantaged populations stemming from social and physical environmental exposures; develop and test interventions to improve health outcomes.

<u>Potential New Research Initiative: Centers for Health Disparity Research and Intervention</u>

The NIEHS proposes to create Centers for Health Disparity Research and Intervention to address the problem of health disparities from an interdisciplinary perspective. These centers will bring researchers together to elucidate underlying mechanisms by which the interaction of socioeconomic status (SES), social, and physical environments leads to health disparities. The social environment includes individual and community-level characteristics, e.g., socioeconomic status (SES), education, coping resources and support systems, residential factors, cultural variables, institutional and political forces such as racism and classism, familial factors, and media influences. The physical environment includes physical agents (e.g., radiation), chemical agents (e.g., pesticides) and biological agents (e.g, pathogens, harmful algal blooms) to which individuals are exposed in a multitude of settings, including home, school, and workplace. Recent results suggest that

factors such as access to and quality of health care and individual lifestyle choices, e.g., smoking or alcohol consumption, are not the primary causative agents underlying disparate health outcomes for those of low SES. Indeed, these findings act to shift research emphasis toward examination of mechanisms by which social and physical environments interact with SES to produce health disparities. The ultimate goal of this research program is to eliminate disparate health outcomes endured by specific subgroups of our population that occupy the lower ranges of socioeconomic strata. Such research will clarify biological and behavioral processes that lead to health disparities as a basis for developing intervention strategies. These Centers will then carry out and evaluate community-based intervention research projects in order to reduce the unequal burden of morbidity and mortality borne by low SES and minority populations.

The role of SES, social, and physical environments in determining disparities over the lifecourse will be explored. These effects may be multigenerational in nature and may also differ in time due to SES mobility and critical windows of vulnerability. Interaction between race/ethnicity and SES will also be examined. Opportunities to study mechanisms and genetic susceptibilities that contribute to disparities present themselves over multiple developmental stages. The link between SES, social, and physical exposures and allostatic load will be defined. There are limited data on SES-related biological mediators of interactions between psychosocial stressors and environmental exposures and their associated health outcomes, e.g., altered hypothalamic-pituitary-adrenal axis function, sympathetic and parasympathetic nervous system function, molecular and cellular biology of organ systems, and immune responses. Community-based intervention strategies to reduce or eliminate health disparities will be developed, implemented, and evaluated. Such strategies may extend beyond the traditional confines of biomedical and behavioral research. Studies may be considered that have the capacity to identify and evaluate the role of economic, social, cultural, and policy incentives in eliminating or reducing exposure related health disparities. These interdisciplinary Centers, uniting both biomedical and behavioral/social scientists, will thus elucidate roles, contributions, and interactions of SES, social, and physical exposures to disparities in health outcomes and enable the implementation of interventions to alleviate such disparities.

III. Area of Focus #2: Disparities in Minority Children's Health

Introduction/Background: Children are thought to be particularly vulnerable to environmental toxicants. Children have a unique physiology that can render them more vulnerable to adverse environmental effects. Exposures that can have negligible effects in an adult can have potentially devastating effects in an infant or child. Disparities in children's health due to environmental factors is thus of major importance in the overall research agenda for addressing health disparities.

NIEHS has a number of studies focusing on the effects of environmental agents on the health of minority and socioeconomically-disadvantaged children. Some of these are:

- Treatment of Lead-Exposed Children Clinical Trial: The Office of Research on Minority Health (ORMH) is partnering with NIEHS to support this clinical trial that will test the chelating drug, succimer's, ability to reverse the detrimental neurobehavioral outcomes due to moderate blood lead levels. Participants of the study receive home lead abatement and vitamin and mineral supplementation. A three-year follow-up of the clinical trial will monitor the cognitive and behavioral development of the children.
- Children's Environmental Health and Disease Prevention Centers (see initiative description below)
- PCBs Effects on Children of the Mohawk Nation: Polychlorinated biphenyls (PCBs) exposure is being assessed among a group of Mohawk children. Their physical and cognitive development is being monitored for childhood health effects from exposure to PCBs as well as mercury, lead and fluoride with the intent of creating prevention methods to cease such exposure.
- Five-Cities Study: NIEHS is presently investigating the degree of risk presented to minority and socioeconomically-disadvantaged youth respiratory health from exposures, such as acid aerosols, air pollution and ozone.
- Inner-City Asthma Study: This study is a collaborative effort with the National Institute of Allergy and Infectious Diseases (NIAID). The goal of this study is to devise an intervention program aimed at reducing asthma morbidity rates among minorities.
- Respiratory Health in Harlem: Respiratory health in the West and Central Harlem and Washington Heights communities is gathered and analyzed by linking sociodemographic characteristics, exposure data and respiratory health outcome data. Geographic analyses are promoted by NIEHS through the development of a Geographic Information System (GIS) research capabilities with the Harlem Center for Health Promotion and Disease Prevention and the Center for Environmental Health in Harlem. This will create a geographical representation of the communities' air quality and define a framework for analyzing other diseases and their causal agents.
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Goal 1: Improve understanding of environmentally-related diseases and dysfunctions in minority and disadvantaged children; design and test interventions to prevent disease in children.

Potential Expanded Initiative: New Children's Environmental Health and Disease Prevention Centers. NIEHS has partnered with the Environmental Protection Agency (EPA) and the Center for Disease Control and Prevention (CDC) to create the first Federal research center devoted exclusively to children's environmental health and disease prevention. These centers are required to promote community involvement, public input for center research agendas and collaboration between the community and the researchers. The first set of centers to be funded included eight programs:

- University of Southern California—Children's respiratory diseases;
- University of California, Berkeley—Impact of pesticides on children's growth and development;

- University of Washington, Seattle—Children's susceptibilities to pesticides;
- University of Iowa—Causes of airway disease in rural children;
- University of Michigan—Childhood asthma;
- Johns Hopkins University—Environmental pollutants, allergens and asthma in inner-city children;
- Mount Sinai Medical Center—Potential risks to inner-city children from pesticides, lead and PCBs; and
- Columbia University—Environmental risks to African-American and Hispanic infants and children.

NIEHS is proposing to expand the number of programs supported with the intention of covering additional minority populations as well as supporting research on more critical areas of children's environmental health, especially behavioral and developmental outcomes.

IV. Disparities in Minority Women's Health

Introduction/Background: Certain diseases appear to affect women disproportionately, and minority women bear an excess burden of some diseases that may have an environmental component. NIEHS is currently supporting several critical studies targeting some of these diseases, and would like to expand its efforts:

- The Carolina Lupus Study: Systemic Lupus Erythematosus (SLE) is an autoimmune disease that can causes severe damage to the kidneys, joints and other tissues. The disease appears to primarily affect women, and African-American women are four times more likely to develop SLE than Caucasian-American women. NIEHS has collaborated with ORMH with this population-based, case-controlled study focusing on evaluating environmental and occupational factors in order to understand the etiology of the disease and to develop preventive strategies. Ninety percent of the study' s participants are women and of that percentage, fifty-five percent are African-American.
- Uterine Fibroids: Uterine fibroids are a leading indicator for hysterectomy among pre-menopausal women in the United States. African-American women are known to have a higher risk than Caucasian-American women for the development of uterine fibroids based upon hysterectomy statistical data. ORMH and NIEHS have created a study analyzing possible environmental causes regarding the difference in risk of uterine fibroids development between African-American and Caucasian-American women.
- Low-Birth Weight in Minority Populations: An NIEHS-supported study is investigating the role of lead in causing low birth weight among pregnant mothers. Bone lead levels are calculated and recorded with the corresponding birth weight. This study and other NIEHS-sponsored studies are aiming at identifying effective therapeutic interventions for present lead exposure of pregnant minority women.
- Molecular Epidemiological cohort study: a study of African-American and Hispanic mothers and newborns and the role of polycyclic aromatic hydrocarbons and environmental tobacco smoke in procarcinogenic and developmental damage.

Goal 1: Improve the understanding of the role of social and environmental factors in development of diseases disproportionately affecting minority women.

Potential New Initiative: The Sister Study. The risk of breast cancer is elevated among some African-American women. NIEHS is putting together a study of sisters of women who have had breast cancer in order to examine the role of genes and the environment in the development of this disease. Extensive efforts are planned to recruit minority women to this study in order to answer these questions with respect to their risk of breast cancer.

Potential New Initiative: LowBirth Weight in Minority Populations Program Announcement: NIEHS is in collaboration with the National Institute of Nursing Research, the National Institute of Dental and Craniofacial Research and the National Institute of Child Health and Human Development in the support of a Program Announcement on "Low-Birth Weight in Minority Populations". The objective is to increase research efforts in this area, the development of innovative strategies to prevent low-birth weight in minority populations and the environmental factors that affect pregnancy.

V. Infrastructure or Cross-Cutting Issues

Goal 1: Career Development and Biomedical Research Training

Potential Expanded Initiative: Advanced Research Cooperation in Environmental Health (ARCH): This program is designed to increase the competitive ability of minority-based institutions in the area of environmental health research through collaboration with another academic institution. The ARCH program has had two minority universities participate while in its pilot stage: Xavier University of Louisiana has been partnered with Tulane University and Southern University at Baton Rouge with University of Texas Medical Branch in Galveston. NIEHS proposes to expand this program to additional HBCU's as well as to other minority institutions.

Potential Expanded Initiative: Meyerhoff Scholars Program. The University of Maryland at Baltimore County (UMBC) is working with NIEHS and the National Science Foundation in encouraging African-American students at UMBC to pursue undergraduate education and post-graduate careers in the field of biomedical science.

Potential Expanded Initiative: Environmental Toxicology Program at the Ponce University School of Medicine. NIEHS is assisting in the establishment of an environmental toxicology program at the Ponce University School of Medicine in Puerto Rico. The program will focus on Clinical Toxicology, Marine Toxins, Oxygen-free Radical Toxicology and Molecular Toxicology. This collaborative initiative will allow NIEHS to investigate local environmental health concerns and enhance the competitive ability of the university for NIH grant monies by partnering them with NIEHS Centers' investigators.

Potential Expanded Initiative: Morehouse College Public Health Science Institute. NIEHS, in association with Morehouse College in Atlanta, provides research and training opportunities for its students in a cooperative summer program. The three-month internships are designed to train students in the quantitative and biomedical areas of environmental health sciences.

Potential Expanded Initiative: Clinical Research Associates Program. Socioeconomically disadvantaged are affected by the inability to afford the cost of higher education. In order to combat this dilemma, NIEHS, the North Carolina Biotechnology Center and the Durham Technical Community College have developed the Clinical Research Associates Program that awards upon completion an Associate's Degree in Clinical Trials Research. This will provide a scientific foundation for graduates and improve their career-marketability with Research Triangle Park, NC area's biomedical and research facilities.

Potential Expanded Initiative: Individual National Research Service Award. The recipients of the Pre-doctoral fellowship award are minority students pursuing a doctorate in the field of science. NIEHS plans on expanding this initiative by collaborating with the National Institute of General Medical Sciences (NIGMS).

Goal 3: Educational Programs

Introduction/Background: NIEHS has created programs in order to establish a sound scientific foundation among minorities and the socioeconomically disadvantaged through the education of the youth.

Potential Expanded Initiative: K-12 Environmental Health Science Education. The objective of this program is to improve the understanding of environmental health issues and to expand career awareness for students interested in pursuing research and service occupations in environmental health sciences. Educational materials for the students and training for teachers in environmental health sciences are developed by this grant program.

VI. Public Information/Outreach

Goal 1: Ensure that minority and disadvantaged communities have the best available information to help them reduce their risk of developing environmentally-related disease.

Goal 2: Empower minority and disadvantaged communities by forming partnerships with researchers to help identify and address environmentally related concerns in their communities.

Potential Expanded Initiative: Community-Based Prevention/Intervention Research Projects. These projects focus on developing prevention and intervention strategies while

remaining constant with the needs of the affected communities and promotes community involvement in those strategies. NIEHS presently has several of these programs in the following states: Florida, Illinois, New York, North Carolina, Oklahoma, Oregon, Pennsylvania and Washington State. The programs have initiatives aimed at the study of agricultural pesticide exposure, asthma and lead poisoning, as well as other minority population health concerns.

Potential Expanded Initiative: Environmental Justice: Partnerships for Communication. Environmental Justice is a grant program created by NIEHS as a means of empowering communities and fostering community involvement in identifying and addressing their respective environmental health risks. This is one of many ways that the community has influence on the Research Agenda regarding its environmental hazards by becoming a constructive partner with the researchers and health care providers.

Potential New Initiative: Spanish Translations of Environmental Health Information. The NIEHS has developed a web site for Spanish-speaking children (See **http://www.niehs.nih.gov/kidspan/kids.htm**) and is presently developing a Spanish translation version of the NIEHS web site.